An Analysis of the Environmental Impact of Combined Sewer Overflow on the Receiving Waters

Whole term	2004. 7 ～2005. 3	

(Purpose)

In order to grasp quantitatively the influence on the discharge place water area by the diffusion phenomenon and the measure against a combined sewer system improvement to a discharge place water area of a corruption substance which are included in (CSO : Combined Sewer Overflow) of a combined sewer system, While considering influence analysis of a city discharge place water area which utilized the model as research of the corruption substance diffusion simulation model for the order style river and admiration tide river of a discharge place water area, Nagoya-city and this foundation From the Heisei 16 fiscal year, for 4 years, a simulation model is created about the main rivers in Nagoya, and monitoring investigation, and influence analysis and evaluation will be advanced one by one.

(Result)

1．A setup of a simulation model

The action of the corruption substance in an admiration tide river.

Since it was greatly influenced by ①The amount of outflow suicide by drowning, and inflow water quality ②Waterway form ③Temperature ④The density distribution and chemical reaction by salt concentration ⑤Production consumption by winding up from river bottom etc, the simulation model was set up for the action of the corruption load by these factors by the substance income-and-outgo rule of a lead Naoji dimension (the direction of a flow, and the depth direction).

【The water quality concentration income-and-outgo rule of a lead Naoji dimension】

$$\frac{\partial C}{\partial t} = -\frac{1}{A}\left|CuB\right|_{X_i}^{X_{i+1}} - \frac{1}{A\cdot\Delta Z}\left|CwA\right|_{Z_n}^{Z_{n+1}} - \frac{1}{A\cdot\Delta Z_b}C_b q_b + \frac{1}{A}\left|D_{cx}\frac{\partial C}{\partial x}B\right|_{X_i}^{X_{i+1}} + \frac{1}{A\cdot\Delta Z}\left|D_{cz}\frac{\partial C}{\partial Z}A\right|_{Z_n}^{Z_{n+1}} - \frac{1}{A\cdot\Delta Z}\left|Cw_o A\right|_{Z_n}^{Z_{n+1}} + R$$

C：Water quality concentration（BOD,COD,DO,T-N,T-P, Coliform bacteria count）A：The horizontal cross-section area of a cell u,w：The flow velocity ingredient
ΔZ：Thickness of a cell D_{cx} ,D_{cz}：Concentration diffusion coefficient w_o：Sedimentation velocity R：The production consumption coefficient of water quality concentration

2．Analysis result

⑴ BOD and the analysis value of COD showed change approximated with the observation value, and it was verified that this model is reproducing the outflow characteristic of corruption load notably. It became clear that a pollution load was reduced comparatively for a short time.

⑵ About pathogenic bacteria, such as a coliform bacteria count and the number of fecal-coliform-bacteria groups, like the case of T-P, although the difference was looked at by the peak value with the observation value and the analysis value, the action which approximated a change with the passage of time was seen, and it became clear that prolonged influence remained comparatively rather than organic corruption.

⑶ The influence by CSO is concentrated on the freshwater region (surface) where chloride ion concentration is low, and there are comparatively few sea water regions (lower layer).

(Study schedule)

Reappearance-ization of the further model is attained about pathogenic microbes, such as T-N, T-S, and coliform bacillus, from now on, and research is advanced about the effect by the measure against an improvement of the present condition analysis of the river by CSO, or a combined sewer system.

Co-researcher：Nagoya-city

Researchers：Nobuyuki Horie, Masahiro Kabata, Takehiro Furuya

key words	Combined Sewer Overflow corruption load, An admiration tide river, Diffusion outflow analysis in case of rainy weather